

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 117-118.] SEPTEMBER and OCTOBER. [1896.

DXXVI.—WHITE TEA OF PERSIA.

(*Camellia theifera*, Griff.)

In the Consular Report on the trade of Ispahan and Yezd (Foreign Office, Annual Series, 1896, No. 1662) the following particulars are given of the tea trade in Persia:—

“Black or Calcutta tea for Persian consumption, continues to arrive in steady quantities, 2,000,000 pounds representing last year’s supply. White tea from China, or more particularly from Tongking, is consumed only in Yezd, and, therefore, the supply is limited.”

Through the courtesy of Mr. John R. Preece, Her Majesty’s Consul at Ispahan, Kew received a small quantity of the “White tea” above-mentioned for the Museum of Economic Botany. The tea proved to be very similar to that described in the *Kew Bulletin* under the name of P’u-êrh tea (*Kew Bulletin*, 1889, pp. 118 and 139). The finest of this tea is said to be reserved for the Court of Peking. The sample from Yezd was composed of the undeveloped leaf buds so thickly coated with fine hairs as to give them a silvery appearance.

Owing to the shaking in transit some of the hairs had been rubbed off and had formed small yellow pellets about $\frac{3}{8}$ -inch diameter. Although the hairs are much more abundant than usual there is little doubt that the leaves have been derived from the Assam tea plant (*Camellia theifera*, Griff.) found wild in some parts of Assam and Burma but now largely cultivated in Burma, Tongking, &c. The same species has been shown to yield Lao tea (*Kew Bulletin*, 1892, p. 219), and Leppett tea (*Kew Bulletin*, p. 1896, p. 10).

The liquor from the Persian white tea was of a pale straw colour with the delicate flavour of good China tea. It is not unknown but now little appreciated in the English market. The following particulars respecting it have been kindly communicated to Kew by a well-known firm of tea brokers in the city.

MESSRS. GOW, WILSON, AND STANTON to ROYAL GARDENS, KEW.

13, Rood Lane, London, E.C.,
13th August, 1896.

SIR,

WE duly received your kind letter of last Tuesday's date, together with the sample of tea you had received from Persia. This class of tea has been very scarce during the last few years upon the London market, the price which the English trade were prepared to pay being very unsatisfactory compared with that which could be obtained in Persia. In London this class of tea is called Flowery Pekoe Congou, and the last lot that we remember having seen, which was some two or three years ago, we ourselves sold to a client in Constantinople, the tea evidently being destined for the Persian market.

The name by which you say it is known in Persia, "White Tea," very truly describes the article, but the particular sample which you sent is not so white or silky as some we have previously seen.

For home consumption this tea is not worth much more than 1s. per pound, but for export purposes, especially to the market that you named, good specimens command as much as 3s. to 5s. per pound.

We are, &c.

(Signed) GOW, WILSON, AND STANTON.

Dr. Morris, C.M.G.,
Assistant Director,
Royal Gardens, Kew.

DXXVII.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECADES XXVIII.—XXX.

271. *Grewia batangensis*, *Wright* [Tiliaceæ]; arborea, ramis teretibus foliis ovatis acuminatis glabris membranaceis breviter petiolatis nervis secundariis 6-7, cymis axillaribus paucifloris, sepalis ligulatis subtus et supra ad marginem pubescentibus, petalis quam sepala multo brevioribus orbiculatis hirsutis basi intus foveolatis, filamentis sepalis æquilongis tenuibus, antheris oblongis, ovario globoso hirsuto, stylo staminibus æquilongo hirsuto, ovulis pluribus.

Habitat.—W. Tropical Africa: Batanga, *G. L. Bates*, 328.

Arbor 15-pedalis. *Folia* 5-6 poll. longa, 2½ poll. lata. *Sepala* 6 lin. longa, 1 lin. lata. *Petala* 1 lin. diam.

272. *Elæocarpus floridanus*, *Hemsl.* [Tiliaceæ]; præter flores fere omnino glaber, ramulis floriferis crassiusculis, foliis longe petiolatis tenuiter coriaceis ovatis obtusis basi cuneatis remote crenulatis venis primariis lateralibus utrinque 5-7, racemis gracilibus laxis puberulis folia superantibus, pedicellis gracilibus, sepalis lanceolatis vix acutis extus puberulis intus glabris carinatis, petalis oblongis apice sæpe circiter novemfidis (laciniis filiformibus) extus pubescentibus intus lanatis basi bifoveolatis, filamentis puberulis, antheris longe apiculatis, ovario glabro stylo filiformi stamina superante, drupis globosis pisiformibus nitidis.

Habitat.—Solomon Islands: Florida Island, *H. B. Guppy*, 231.

Arbor usque ad 30 ped. alta (fide Guppy). *Folia* absque petiolis 4-5 poll. longa, petiolis $1\frac{1}{2}$ -2 poll. longis. *Racemi* 7-8 poll. longi. *Pedicelli* 4-6 lin. longi. *Drupa* sicca 4-5 lin. diametro.

273. *Elæocarpus fauroensis*, Hemsl. [Tiliaceæ]; foliis breviter petiolatis tenuiter coriaceis oblongis oblanceolatis vel obovato-lanceolatis obtusis vel rotundatis basi cuneatis crenulatis utrinque glabris venis primariis lateralibus numerosis, racemis brevibus, floribus drupis cæruleis (fide Guppy), globosis epicarpio tenui endocarpio durissimo irregulariter alte sulcato.

Habitat.—Solomon Islands: Fauro Island, H. B. Guppy, 241.

Arbor 70-pedalis (fide Guppy). *Folia* cum petiolo brevi 7-8 poll. longa, 2-2 $\frac{1}{2}$ poll. lata. *Pedicelli* circiter pollicares. *Drupa* sicca circiter 9 lin. diametro.

274. *Elæocarpus rarotongensis*, Hemsl. [Tiliaceæ]; præter flores glaber, ramulis floriferis crassiusculis, internodiis-quam folia multoties brevioribus, foliis longe graciliterque petiolatis tenuisculis coriaceis ovato-oblongis obtuse acuminatis remote calloso-crenulatis undulatis venis primariis lateralibus utrinque 7-9 supra medium furcatis in crenis excurrentibus, petiolis gracillimis basi leviter incrassatis apice geniculatis, racemis numerosis multifloris in axillis foliorum superiorum solitariis, floribus mediocribus pedicellatis, pedicellis puberulis, sepalis anguste lanceolatis vix acutis extus pubescentibus intus glabris carinatis, petalis oblongis sæpe quinquefidis extus pubescentibus intus pilis longis retrorsis dense vestitis carinatis basi bifoveolatis, disco cupulari margine puberulo, filamentis brevibus filiformibus puberulis, antheris apiculatis, stylo stamina paulo superante, drupis parvis ovoideis.

Habitat.—Cook Islands: Rarotonga, Rev. W. Wyatt Gill.

Folia absque petiolis 3-6 poll. longa, petiolis 1-2 poll. longis. *Racemi* 2-4 poll. longi. *Pedicelli* fructiferi 4-6 lin. longi. *Sepala* et *petala* circiter 2 lin. longa. *Drupæ* 4-6 lin. longæ.

275. *Impatiens Batesii*, Wright [Geraniaceæ]; herbacea, debilis, caule succulento procumbente, foliis alternis petiolatis ovato-lanceolatis membranaceis crenulatis inter crenulationes minute denticulatis utraque hirsutis, pedunculo longissimo debili, floribus purpureis racemosis, bracteis parvis ovatis, sepalis lateralibus ovatis uninerviis, sepalo antico ore obliquo basi in calcar gradatim curvatum producto, petalo postico orbiculari, petalis lateralibus longe unguiculatis lobis lateralibus rotundatis quam anticos deltoideos majoribus.

Habitat.—West Tropical Africa: Cameroons, Efulen, G. L. Bates, 286.

Caulis 6 poll. altus. *Folia* 2-2 $\frac{1}{2}$ poll. longa, 1-1 $\frac{1}{4}$ poll. lata; petioli 1-1 $\frac{1}{2}$ poll. longi. *Pedunculus* 6 poll. longus; pedicelli 3-6 lin. longi. *Sepalum* anticum 6 lin. longum. *Petala* lateralia 8 lin. longa.

Somewhat resembling *Impatiens palpebrata*, Hook. f., in having a long claw to the lateral petals and also in the shape of their laminae. The spur of the anticus sepal is slightly and gradually curved.

276. *Gomphia discolor*, Wright [Ochnaceæ]; fruticosa, ramosa, ramis lævibus teretibus, foliis oblanceolatis acutis coriaceis brevissime petiolatis

supra viridibus subtus aureis nitentibus venulis secundariis numerosissimis approximatis, paniculis multifloris ad ramorum apices terminalibus vel subterminalibus, bracteis parvis deltoideis, sepalis oblongis acutis marginibus membranaceis post anthesin accrescentibus, petalis ovatis apiculatis unguiculatis flavis fugaceis, antheris subsessilibus subulatis rugosis poris 2 terminalibus dehiscentibus, ovario alte 5-lobato 5-loculari, ovulis solitariis erectis, stylo antheris paullo longiore, drupis 2-3.

Habitat.—W. Tropical Africa: Batanga, *G. L. Bates*, 347.

Frutex 2-3 pedalis. *Folia* 6-7 poll. longa, $1\frac{1}{2}$ -2 poll. lata. *Flores* 6-8 lin. diam. *Drupæ* 2 lin. diam.

277. *Trichilia alata*, *N. E. Brown* [Meliaceæ]; foliis alternis petiolatis trifoliatis vel pinnatim 3-7 foliolatis, foliolis oppositis sessilibus elliptico-oblongis cuneato-obovatis oblongo-lanceolatis oblongis vel lanceolatis obtusis vel retusis basi cuneatis marginibus leviter revolutis coriaceis opacis costa utrinque prominente et acuta venis inconspicuis, rachi alata, floribus parvis in cymas parvas corymbosas 10-30-floras terminales vel subterminales glabras dispositis, pelicellis brevibus subcrassis, calyce breviter 4-dentato vel late 4-crenato glabro, petalis 4 valde imbricatis ellipticis vel elliptico-obovatis obtusis extus glabris intus minute puberulo-venosis albis, staminum tubo quam petala duplo brevior extus glabro intus villosus apice inæqualiter 8-dentato dentibus omnibus ad apicem antheriferis, antheris 8 oblongis obtusis glabris, disco brevissimo staminum tubo basi adnato 4-crenato, ovario compresso-ovoideo in stylum crassum attenuato glabro 2-loculari loculis 2-ovulatis, fructu (immaturo?) compresso-globoso 2-spermo, seminibus planoconvexis tenuiter albuminosis, cotyledonibus subplanis crassis, radícula exserta.

Habitat.—Natal: Umhloti, *Wood*, 1022; Groenberg, *Wood*, 1043, and near Pinetown 1100 ft., *Wood*, 3403, 5439. Transvaal: near Berberton, on the eastern slopes of the Saddleback Range, 4500 ft., *Galpin*, 1226, and at Upper Moodies, 4400 ft., *Galpin*, 1083.

Frutex vel arbor usque ad 25 ped. alta. *Folia* $1\frac{3}{4}$ -5 poll. longa, $1\frac{1}{2}$ -3 poll. lata; foliorum petioli $\frac{1}{2}$ - $1\frac{1}{4}$ poll. longi, foliola 1-2 poll. longa, 3-9 lin. lata. *Cymæ* 6-10 lin. diam. *Pedunculi* 4-14 lin. longi. *Pedicelli* $\frac{1}{3}$ -1 lin. longi. *Calyx* $\frac{1}{3}$ - $\frac{1}{2}$ lin. longus. *Petala* $1\frac{1}{4}$ lin. longa, 1 lin. lata. *Staminum tubus* $\frac{3}{4}$ -1 lin. longus, antheræ $\frac{1}{2}$ lin. longæ. *Fructus* 3-4 lin. diam.

From the presence of albumen in the seed and the exserted radicle of the embryo, this plant would fall under the tribe *Meliæ* according to the characters given in C. De Candolle's monograph, but upon examination, I find that the characters of albumen and radicle do not hold good in all cases, as the genera are at present defined, and as in other respects it agrees with *Trichilia*, I refer it to that genus. *T. alata* appears to be allied to the West Indian *T. havanensis*, Jacq., which it somewhat resembles in foliage and has the same seed structure. It also bears a considerable resemblance to *Cipadessa boiviniana*, Baill., from Madagascar, but the stamens of that plant are entirely different.

278. *Chailletia chartacea*, *Wright* [Chailletiaceæ]; fruticosa, ramis gracilibus foliis brevissime petiolatis ovatis acuminatis glabris (costis subtus exceptis), cymis axillaribus paucifloris, sepalis oblongis primum extus pubescentibus ab ovario liberis, petalis spathulatis bifidis, staminibus petalis æquilongis antheris parvis albis, ovario globoso pubescente

triloculari, ovulis solitariis pendulis, stylo elongato filiformi apice trifido.

Habitat.—West Tropical Africa: Batanga, *G. L. Bates*, 337.

Frutex 4–5 ped. altus. *Folia* 2–3 poll. longa, 1–1½ poll. lata; petioli 1 lin. longi. *Flores* 2 lin. diam.

279. *Crassula aloides*, *N. E. Brown* [Crassulaceæ]; caule erecto robusto apice dense folioso basi nudo, foliis aloiformibus confertis rosulatis valde recurvatis rectis vel leviter falcatis sessilibus e basi ad apicem gradatim attenuatis acuminatis glabris subflaccidis minute cartilagineo-ciliatis utrinque viridibus non glaucis, pedunculo elongato, corymbo amplo ramulis parce papillato-scaberulis, bracteis sessilibus attenuato-acuminatis ciliatis glabris, floribus parvis numerosissimis dense confertis pedicellatis pallide luteis, calyce usque ad medium 5-lobo lobis ovatis acutis glabris, petalis quam calyx subtriplo longioribus oblanceolato-oblongis obtusis apice dorso minute tuberculatis glabris, staminibus quinque petalis æquilongis, squamis hypogynis cuneato-obcordatis quam carpella subtriplo brevioribus.

Habitat.—Transvaal: Houtbosch, *Rehmann*, 6375; hillsides, in damp places near Barberton, 2000–4000 ft., *Galpin*.

Caulis plantæ juvenilis 1–1½ poll. crassus. *Folia* 10–18 poll. longa, basi 1½–2½ poll. lata. *Pedunculus* 3–4 ped. altus. *Corymbus* 18 poll. diam. *Pedicelli* 1¼–1½ lin. longi. *Calyx* ½ lin. longus, lobis ¼ lin. longis. *Petala* 1½ lin. longa, ½ lin. lata. *Squamæ* ¼ lin. longæ.

Young plants of this very remarkable species are in cultivation at Kew, raised from seeds sent by Mr. Galpin. Its general appearance is very much like that of an *Aloe* with thin drooping leaves.

280. *Luffa Batesii*, *Wright* [Cucurbitaceæ]; scandens, suffruticosa, foliis cordatis integris vel sparse angulato-dentatis glabris nervis dense reticulatis præsertim ad inferam paginam elevatis, petiolis elongatis eglandulosis, cirrhis lateralibus 2-fidis, floribus masculis racemosis bracteis subulatis pedicellis plus minusve adnatis, calyce infundibuliformi inferne inflato dentibus parvis acutis eglandulosis, petalis liberis obovatis lateis nervis primariis secundariisque fuscis, staminibus 5 calycis ori insertis, filamentis liberis brevibus compressis, antheris bilocularis contortis, floribus femineis non visis.

Habitat.—West Tropical Africa: Cameroons River, *G. Mann*, 719; Efulen, *G. L. Bates*, 218; Batanga, *G. L. Bates*, 338; Angola, 70 miles from Ambriz on the road to Bembe, *Monteiro*

Caulis 20 ped. longus (ex *Mann*). *Folia* 5 poll. longa, 4 poll. lata, petioli 2 poll. longi. *Racemus* 8 poll. longus. *Calyx* 8 lin. longus, apice 3 lin. diam. *Corolla* 3 poll. diam.

This is readily distinguished by the long calyx-tube inflated below so as to resemble an ovary, and, by the stamens all bearing bilocular anthers.

281. *Alepidea setifera*, *N. E. Brown* [Umbelliferae]; caule erecto apice corymboso-vel paniculato-ramoso folioso, foliis radicalibus petiolatis lineari-oblongis vel ellipticis acutis vel obtusis marginibus longe setoso-dentatis utrinque glabris, foliis caulinis numerosissimis sessilibus auriculatis amplexicaulibus imbricatis lineari-lanceolatis vel ovato-lanceolatis marginibus longe setoso-dentatis utrinque glabris,

inflorescentiæ ramulis 1-3-capitatis ad medium tribracteatis glabris vel minute glandulosis, capitulis 13-15-floris 8-10-bracteatis bracteis basi connatis lanceolatis acutis mucronatis glabris, floribus sessilibus, calycis dentibus deltoideis acutis, fructibus plus minusve papilloso-rugosis.

Habitat.—Transvaal: Hoghe Veldt, Pages Hotel, *Rehmann*, 6849; swampy ground, Umlomati Valley, Barberton, 4000 ft., *Galpin*, 1290. Natal: hill near Van Reenen's Pass, 5000-6000 ft. *Wood*, 5630.

Herba 12-18 poll. alta. *Folia* radicalia cum petiolo 1-2 poll. longa, 3-7 lin. lata, caulina 5-9 lin. longa, 2-5 lin. lata. *Inflorescentiæ ramuli* 9-15 lin. longi. *Involuti bractæ* 2-3½ lin. longæ, ½-1 lin. latæ.

282. *Chrysophyllum batangense*, *Wright* [Sapotaceæ]; arbor parva, foliis anguste oblanceolatis obtuse acuminatis coriaceis subtus glaucescentibus nervisque conspicuis, floribus paucis in axillis foliorum vetustiorum fasciculatim congestis, sepalis liberis oblongo-ovatis pubescentibus, corolla 5-partita quam sepala paulo longiore lobis ovatis imbricatis, staminibus corollæ tubo adnatis et lobis ejusdem oppositis, ovario 5-lobato, 5-loculari, stylo indiviso, ovulis solitariis.

Habitat.—West Tropical Africa: Batanga, *G. L. Bates*, 325.

Folia 6 poll. longa, 1½ poll. lata; petioli 3-6 lin. longi. *Flores* 3 lin. diam.

283. *Strychnos Gerrardi*, *N. E. Brown* [Loganiaceæ]; inermis ecirrhosa, ramis teretibus cortice griseo, foliis petiolatis lanceolatis ellipticis vel elongato-obovatis apice obtusis obtuse acuminatis vel obtusissime rotundatis basi cuneato-acutis pergamentaceis glabris 3-nerviis lateralibus 2-3 lin. supra laminæ basin abeuntibus nervis venisque utrinque prominentibus, cymarum axillarium subfasciculatarum ramulis 3-5-floris, sepalis orbiculatis obtusissimis ciliolatis, corollæ tubo cylindrico extus glabro intus ad faucem pilis albidis densissime intertextis barbato lobis 4 ovatis subacutis glabris patentibus.

Habitat.—Natal: Berea, *Wood*, 5624; in Gardens, *Wood*, 1777; without locality, *Gerrard*, 1421.

Foliorum petioli 1-3 lin. longi, laminæ 1¼-4 poll. longæ, ½-1¼ poll. latæ. *Cymarum rami* vel pedunculi 1-2 lin. longi. *Pedicelli* ½-1½ lin. longi. *Sepala* ¾-1¼ lin. longa et lata. *Corollæ tubus* 1¼ lin. longus, lobi 1-1¼ lin. longi.

284. *Xysmalobium obscurum*, *N. E. Brown* [Asclepiadææ]; caule simplice pubescente, foliis subsessilibus lanceolatis acutis basi cuneatis utrinque glabris venis reticulatis prominentibus marginibus anguste revolutis, umbellis lateralibus sessilibus 4-6-floris, pedicellis pubescentibus, sepalis lanceolatis acuminatis glabris, corollæ lobis ovatis acutis reflexis glabris, coronæ lobis erectis crasso-carnosis subobovoideo-oblongis obtusis ecarinatis.

Habitat.—Nyasaland, *Buchanan*.

Planta circa 1 ped. alta. *Folia* 2-2¾ poll. longa, 5-7 lin. lata. *Pedicelli* 2-4 lin. longi. *Sepala* 1½ lin. longa. *Corollæ lobi* 2 lin. longi, 1 lin. lati. *Coronæ lobi* ¾ lin. longi.

285. *Ipomœa (Strophipomœa) hirsuticaulis*, *Wright* [Convolvulaceæ]; scandens, caule leviter striato hirsuto, foliis cordatis acuminatis

utrinque glabris longe petiolatis, floribus corymboso-cymosis, sepalis late ovatis breviter mucronatis, corolla quam sepala 4-5 plo longiore, staminibus inæqualibus.

Habitat.—West Tropical Africa: Batanga, *G. L. Bates*, 341.

Folia 3 poll. longa, 2-2½ poll. lata; petioli 2 poll. longi. *Pedunculus* 3-4 poll. longus; pedicelli 4 lin. longi. *Sepala* 4 lin. longa, 3 lin. lata. *Corolla* 1½-2 poll. longa.

Resembling *Ipomœa nuda*, Baker, from which it differs in its hirsute stem and broadly ovate sepals which terminate in a short mucro.

283. *Lyperia punicea*, *N. E. Brown* [Scrophulariaceæ]; caulibus plurimis e rhizomate lignoso perenni annuis basi sæpe decumbentibus foliosis dense glanduloso-pilosis, foliis petiolatis inferioribus oppositis superioribus alternis ovatis apice obtuse rotundatis basi subtruncatis crenato-dentatis utrinque glanduloso-pubescentibus, floribus axillaribus pedicellatis in racemum terminalem dispositis, calyce fere ad basin 5-lobato lobis oblongo-spathulatis apice concavis vel plus minusve complicatis et recurvis subobtusis utrinque glanduloso-pilosis, corolla purpureo-coccinea inæqualiter bilabiata tubo brevi extus glanduloso-pubescente labio superiore minore bilobato lobis rotundatis abio inferiore trilobato lobis lateralibus elliptico-oblongis lobo medio obovato omnibus obtusissimis glabris, staminibus inclusis filamentis glabris, stylo incluso apice subclavato stigmate subcompresso truncato.

Habitat.—Natal: slopes of the Drakensberg, *Evans*, 392; Weenen County, South Downs, at 5000 feet, *Wood*, 4422; Maritzburg County, at 3800 feet, *Wood*, 3572; Faku's Territory, *Sutherland*. East Griqualand: Vaal Bank, *Wood*, 4214; *Haygarth*; near Kokstad, at 5000 feet, *Tyson*, 1645; sides of the mountains at 6000 feet, *Tyson*, 1363.

Caules 4-12 poll. longi. *Foliorum petioli* 1-4 lin. longi, laminæ 3-9 lin. longæ, 3-7 lin. latæ. *Pedicelli* 3½-9 lin. longi. *Calycis lobi* 2½ lin. longi, ¾ lin. lati. *Corollæ tubus* 2½ lin. longus, limbus circa 6 lin. diam. lobis 2-2½ lin. longis, 2¼-2½ lin. latis.

A well-marked species allied to *Chenostoma corymbosa*, Marloth and Engler, which on examination I find to be a *Lyperia* (*L. corymbosa*, N.E. Br), having affinity with *L. canariensis*, Webb. The flowers are stated by Mr. Evans to be "deep scarlet," by Mr. Wood "red" and "dull crimson," and by Mr. Tyson as "intense rosei."

287. *Diclis tenella*, *Hemsl.* [Scrophulariaceæ]; molliter hirsuta, ramosissima, ramis gracillimis debilibus repentibus radicanibus, foliis tenuissimis membranaceis longe graciliterque petiolatis rotundato-ovatis grosse serrato-dentatis basi rotundatis vel subcuneatis, pedunculis axillaribus solitariis capillaribus folia superantibus, floribus parvis, calycis segmentis inæqualibus ovato-oblongis, corollæ labio superiore æqualiter bilobato lobis rotundatis, labio inferiore longiore inæqualiter trilobato lobis lateralibus obliquis intermedio angustiore recto, calcaribus elongato curvato, capsula late bilobata lobis rotundatis.

Habitat.—British Central Africa: Mount Chiradzulu, *A. Whyte*.

Rami 6-12 poll. longi. *Foliorum laminæ* 6-12 lin. latæ, petiolis 3-12 lin. longis sed sæpe circiter 6 lin. longis. *Pedunculi* 1-2 poll. longi. *Calycis segmenta* ½-¾ lin. longa. *Corolla* cum calcaribus 3-4½ lin. longa, parte calcarata 2-3½ lin. longa, limbo circiter 2 lin. diametro. *Capsula* circiter 1½ lin. lata.

288. *Dianthera celebica*, *Rolfe*. [Acanthaceæ]; caule puberulô, foliis petiolatis ovatis subobtusis obscure crenulatis membranaceis supra viridibus subtus subpallidis paucè puberulis, cymis terminalibus laxè paniculatis parvis paucifloris puberulis, bracteis subulato-linearibus, floribus brevissime pedicellatis, calyce profunde 5-partito lobis linearibus subacutis minutissime puberulis, corollæ tubo brevi fauce ampliato lobis rotundato-oblongis, staminibus 2 inclusis, antheræ loculis disjunctis distantibus muticis, capsulis clavatis glabris tetraspermis.

Habitat.—South Celebes: Bonthain Peak, at 7000 ft., *A. H. Everett*, 29.

Folia $\frac{3}{4}$ –2 poll. longa, 5–12 lin. lata; petioli 2–6 lin. longi. *Paniculæ* 2–3 poll. longæ. *Bracteæ* $\frac{3}{4}$ lin. longæ. *Calyx* 2 lin. longus. *Corolla* 5 lin. longa. *Capsulæ* 5 lin. longæ.

Nearly allied to the Himalayan *D. collina*, C. B. Clarke, which it much resembles in general character, except that the corolla is only half as long as in that, and proportionately broader.

289. *Salvia yunnanensis*, *Wright* [Labiataë]; herbacea, rhizomate repente tuberis fusiformibus gerente, foliis sæpius radicalibus longissime tenuiterque petiolatis oblongis crenatis supra viridibus subtus purpureis, inflorescentia simplice verticillis 4–6-floris, calyce glanduloso bilabiato labio postico obscure bifido labio antico dentibus 3 acutis, corolla extus pubescente bilabiata labio superiore falcato labio inferiore patente trilobato lobo terminali integro rotundato quam laterales duplo majore, staminibus stylisque generis.

Habitat.—China: Yunnan, Mongtse, mountain slopes at 5000–6500 ft., *W. Hancock*, 61.

Herba 1 ped. alta. *Folia* $1\frac{1}{2}$ –3 poll. longa, $\frac{3}{4}$ –1 poll. lata; *petiolus* 4 poll. longus. *Calyx* 4–5 lin. longus. *Corolla* 1 poll. longa.

Allied to *S. hians*, Royle, which however has sagittate leaves. The leaves of this species resemble those of *S. scapiformis*, Hance, but the cobalt-blue flowers are very different.

290. *Scutellaria amœna*, *Wright* [Labiataë]; herbacea sparse pilosa, caule erecto obtuse quadrangulâri, foliis oblongis glabris vel sparse pilosis integris breviter petiolatis, floribus erectis per paria in racemos secundos dispositis, pedicellis brevibus, bracteis superioribus quam calyx paullo longioribus, calycis pilosi lobis rotundatis, corolla magna cærulea extus pubescente per tubi curvationem erecta, nuculis non visis.

Habitat.—China: Yunnan, Mongtse, open grassy glens at 5500 ft. *W. Hancock* 2; Szechuen, near Tachienlu, *A. E. Pratt*, 580 and 703.

Planta 1 ped. alt. *Folia* $1-1\frac{1}{4}$ poll. longa, 6 lin. lata. *Calyx* 1–2 lin. longus. *Corolla* 1 poll. longa.

Flowers like those of *S. macrantha*, Fisch., from which this differs in having oblong, not linear-lanceolate leaves.

291. *Freycinetia marantifolia*. *Hemsl.* [Pandanaeæ]; species insignis, nana, erecta, foliis brevissime vaginantibus subcoriaceis obovato-oblongis abrupte cuspidato-acuminatis deorsum leviter attenuatis circiter 40-nerviis aculeis minutis paucissimis in marginibus secus costam et præsertim in cuspidè instructis, bracteis inflorescentiæ delapsis, spadicebus

femineis ternis distincte pedunculatis oblongis, pedunculis crassis glabris, floribus confertissimis infra inter se connatis, baccis parvis placentis 5 multispermis, seminibus fusiformibus curvatis.

Habitat.—Solomon Islands: Fauro Island, *H. B. Guppy*, 324.

Planta tripedalis (fide *Guppy*). *Folia* 5–7 poll. longa, supra medium 2 2½ poll. lata, cuspidate 3–4 lin. longo. *Spadicium pedunculat* 9–12 lin. longi, pars baccas maturas gerens circiter pollicaris.

292. *Freycinetia humilis*, *Hemsl.* [Pandanaceæ]; nana, foliis lanceolatis rigidis coriaceis creberrime nervosis basi leviter dilatatis ut videtur vix vaginantibus basi et apicem versus et subtus secus costam aculeis paucis minutis instructis vix acutis, bracteis non visis, spadicebus femineis binis? longe pedunculatis cylindricis pedunculis crassis glabris, floribus femineis inter se fere liberis, stigmatibus confluentibus, staminodiis filiformibus ovario æquantibus.

Habitat.—Solomon Islands: Fauro Island at 1600 ft., *H. B. Guppy*, 323.

Folium unicum visum sesquipedale. *Pedunculi* circiter bipollicares. *Spadicium femineorum* pars flores gerens 1½–1¾ poll. longa.

293. *Freycinetia rigidifolia*, *Hemsl.* [Pandanaceæ]; gracilis, scans dens (fide *Haviland*) glabra, foliis confertis brevibus angustis rigidirectis ascendentibus vix acutis siccis arcu revolutis multistriatis apicem versus dorso in costa marginibusque aculeis minutis instructis basin versus aculeis majoribus armatis basi late vaginantibus, vaginis latis auriculatis aculeis rectis crebris vix rigidis vaginantibus, spadicebus femineis terminalibus ternis subsessilibus oblongo-cylindricis bracteis crassis lanceolatis rubris apicem versus aculeolatis exterioribus in apicem foliiformem desinentibus circumdati, floribus maxime juvenilibus tantum visis, stigmatibus binis.

Habitat.—Borneo: Sarawak, conglomerate rocks at 2000 ft. *G. D. Haviland*, 436.

Internodia foliis omnino vaginantibus *Folia* circiter pedalia, parte vaginante bipollicari, 4–5 lin. lata, aculeis maximis lineam vix excedentibus. *Bractea* 3–7 poll. longæ, infra medium 8–12 lin. latæ. *Spadices* circiter sesquipollicares.

294. *Freycinetia philippinensis*, *Hemsl.* [Pandanaceæ]; robusta, pedunculis exceptis glabra, foliis confertissimis brevissime vaginantibus tenuibus tenacissimis latis fere oblongis acuminatis deorsum leviter angustatis in marginibus apicem versus et infra medium et dorso secus costam aculeis brevibus instructis creberrime striato-nervosis, nervis utrinque 23–25, bracteis latissimis coloratis exterioribus longioribus superne foliaceis plus minusve aculeolatis, spadicebus femineis 4–5 aggregatis oblongis distincte pedunculatis, pedunculis crassis furfuraceis, floribus femineis confertissimis inter se liberis vel basi tantum coalitis.—*Freycinetia luzonensis*, var. *heterophylla*, Naves in Blanco Fl. Filip. ed. 3. Nov. App. p. 286, t. 437, non Miq.

Habitat.—Philippine Islands: without locality, *Cuming*, 1898.

Folia 12–15 poll. longa, 2–2¼ poll. lata, aculeis ½–1 lin. longis. *Bractea* 1½–2 poll. latæ. *Pedunculi* 1½–2 poll. longi. *Spadicium* pars florifera circiter 1¼ poll. longa.

The figure cited above does not agree exactly with Cuming's plant, the leaves being armed throughout their whole length; but it most probably represents this species, which certainly is not even closely allied to *F. luzonensis*.

295. *Freycinetia Vidalii*, Hemsl. [Pandanaceæ]; species *F. angustifolia* et *F. pycnophylla* similis, caulibus scandentibus dense foliatis, foliis breviter vaginantibus, vaginis auriculatis, tenuibus simul coriaceis lentisque flexuosis angustis fere linearibus sursum valde attenuatis subtus pallidioribus per totam longitudinem in marginibus et dorso ad costam aculeis parvis vel minutis munitis, bracteis lanceolatis coloratis (aurantiace?) exterioribus longe caudatis spadices femineos superantibus, caudicibus plus minusve foliaceis aculeolatis, spadicebus femineis ternis pedunculatis, pedunculis crassis sursum leviter spongiosis, parte florifera parva ovoidea vel oblonga, floribus femineis inter se liberis supra medium stigmatibus nigricantibus exceptis crustaceis eburneis, staminodiis brevibus filiformibus.

Habitat.—Phillipine Islands: Bayombong, Nueva Vircaya, Luzon, Vidal, 3964.

Folia sesquipedalia, maximis $2\frac{1}{2}$ –3 lin. latis. *Bractea* interiores 2 – $2\frac{1}{2}$ poll. longæ; exteriores longiores. *Pedunculi* 1 – $1\frac{1}{2}$ poll. longi. *Spadicis* pars florifera 4–6 lin. longa.

296. *Freycinetia formosana*, Hemsl. [Pandanaceæ]; robustissima, glabra, *F. arborea* affinis, foliis confertissimis superioribus subdistichis lineari-lanceolatis elongatis e basi lata sursum gradatim attenuatis vix acutis basin et apicem versus aculeolatis et aculeolis paucissimis dorso secus costam sparsis, bracteis foliaceis basi latissimis coloratis exterioribus foliis fere æquantibus, spadicebus femineis maximis 3–5 fasciculatim aggregatis valide pedunculatis, floribus femineis inter se fere liberis, staminodiis obsoletis, stigmatibus 3–9 sæpius circiter 6.

Habitat.—Formosa: without locality, Oldham, 630; Kelung, Ford, 45.

Folia 2–3 ped. longa, basi 1 – $1\frac{1}{2}$ poll. lata sursum valde attenuata. *Bractea* basi usque ad $2\frac{1}{2}$ poll. latæ. *Spadices feminei* cum pedunculis brevibus 4–6 poll. longi, sicci 7–9 lin. diametro.

This is very similar to *F. arborea*, Gaud. in general appearance, but the leaves are not aculeate throughout their whole length, and the female spadices are always more than one or two.

297. *Freycinetia Beccarii*, Hemsl. [Pandanaceæ]; species *F. marantifolia* similis sed evidenter scandens caulibus elongatis, foliis ut videtur in apicibus innovationum confertis amplexicaulibus nec vaginantibus tenuiter coriaceis obovato-oblongis vel oblanceolatis abrupte cuspidato-acuminatis deorsum angustatis basin et apicem versus in marginibus aculeolatis dorso supra medium ad costam pauci-aculeolatis multinerviis (utrinque circiter 23–25), bracteis parvis foliaceis, spadicebus femineis ternis parvis valide pedunculatis ovoideis vel oblongis, floribus femineis parvis staminodiis minutis, stigmatibus 2–3.

Habitat.—Borneo: Sarawak, Beccari, 3598.

Folia 3–9 poll. longa, 1–3 poll. lata. *Bractea* semipollicares. *Pedunculi* pollicares. *Spadicium femineorum* pars florifera circiter 6 lin. longa.

298. *Freycinetia Creaghii*, *Hemsl.* [Pandanaeae]; foliis brevibus tenuiter coriaceis laxè vaginantibus linearibus acutis basin et apicem versus minute aculeolatis multinerviis deorsum gradatim minoribus infimis innovationum bracteiformibus, inflorescentia distincte pedunculata, bracteis brevibus latis vix acutis crassis coloratis ornatis, spadicebus masculinis ternis minimis breviter pedunculatis parte florifera cylindrica, staminibus numerosis filamentis fere liberis.

Habitat.—British North Borneo, *Governor Creagh*.

Folia superiora circiter 6 poll. longa, inferiora ad vaginam reducta. *Pedunculi* communi 1–1½ poll. longi. *Spadicium* pedunculi circiter semipollicares, pars florifera 3–4 lin. longa.

299. *Freycinetia caudata*, *Hemsl.* [Pandanaeae]; scandens, epiphytica (fide Horne) caulibus graciliusculis internodiis distinctis, foliis parvis tenuiter coriaceis lineari-lanceolatis abrupte caudato-acuminatis basin versus subito angustatis complicatis semiamplexicaulibus nec vaginantibus apicem versus præsertim in acumine aculeis minutis instructis cum costa circiter 31-nerviis, bracteis coloratis herbaceis lanceolatis aculeolato-cuspidulatis spadices superantibus, spadicebus femineis ternis parvis distincte pedunculatis cylindricis, staminodiis minutis stigmatibus 3.

Habitat.—Fiji: on trunks of trees throughout the islands, *J. Horne*, 592; without locality, *Græffe*.

Folia 2–8 poll. sæpius, 5–6 poll. longa, maxima 1 poll. lata. *Pedunculi* 6–9 lin. longi. *Spadicium* femineorum pars florifera 1–1½ poll. longa.

300. *Freycinetia sumatrana*, *Hemsl.* [Pandanaeae]; robusta, foliis confertissimis coriaceis rigidissimis linearibus longis basi vix dilatatis sursum valde attenuatis sed vix acutis remote aculeolato-denticulatis siccis revolutis creberrime nervosis costa valida, bracteis foliaceis basi coloratis e basi lata longissime caudatis, spadicebus mediocribus quaternis distincte pedunculatis oblongis, staminodiis minimis vel obsoletis, stigmatibus 2–3.

Habitat.—Sumatra: Mount Singalan, *Beccari*, 211.

Folia 2–3 ped. longa, basi circiter 1 poll. lata. *Bractea* 9–12 poll. longæ, basi 1½–2 poll. latæ. *Pedunculi* circiter pollicares. *Spadicium femineum* pars florifera 9–12 lin. longa.

DXXVIII.—NEW SEEDLING SUGAR-CANE IN QUEENSLAND.

The Annual Report of the (Queensland) Department of Agriculture for the year 1894–5, describes the progress (pp. 5–7) of the sugar industry “which may fairly be rated as among the first in Queensland.” Much of the impetus that has been given to the growth and manufacture of sugar during the past three years is attributed to the success of the central mills at Mackay. “The establishment of these mills has led to an entire change in the industry, and especially have they been the cause of large estates being sub-divided and sold, or let on lease in small areas, the existing mills upon these estates being converted into a central

mill." At the present time there are 1387 sugar plantations, with a total area of 69,031 acres. In 1893 the yield of sugar was 76,146 tons, in 1894 it was 91,711 tons. "Not only did 1894 see the greatest number of acres crushed for cane, but it also gave the highest average return per acre, which latter can be set down to favourable seasons and improved machinery." The Under-Secretary for Agriculture adds, "The great influence that the establishment of the central sugar-mill system has exerted over the industry, leads me to point out the further necessary assistance that could be given by the establishment of a State nursery wholly devoted to experiments in the growth and cultivation of sugar-cane. . . . Experiments in the direction indicated have been effected in the existing nurseries at Mackay and Kamerunga." For cultivation in these nurseries new sugar-canes have been obtained from New Guinea. A new variety of considerable promise has also shown itself amongst some seedling canes grown at Kew. These were raised from seed received from the Botanic Station at Barbados in 1889. They were forwarded to Queensland through the Agent-General in London, in October 1890. The new variety has been named "Kewensis." From the particulars of the analysis given below, it would appear to be rich in sugar, and likely to be of great service. It is described as "a splendid cane not so long as many others, but thick, exceedingly heavy, and producing a large number of canes to a stool. The crop coming on is in fine condition, and a good many tons will be ready for distribution by October" (p. 54).

The following extract (p. 20) gives the analytical results as regards the Kew cane:—

"Through the kindness of the Colonial Sugar Company, some of the varieties growing at Mackay were tested by Mr. G. E. Holroyde, the chemist at the refinery, New Farm, the samples of juice submitted to him being from the 'Batoe,' a New Guinea cane, and from the 'Kewensis,' a seedling received from Kew. It is intended that all the varieties of cane growing at the nurseries shall be tested during the coming season, so that only those of value to the sugar-growers shall be retained. Experiments also, as far as land and means will permit, will be made in a systematic manner with the different fertilisers available in the market, to arrive at the effect upon the growth and sugar-producing qualities of the cane. As each nursery is now provided with water, experiments can be more faithfully carried out. The following are the analyses arrived at by Mr. Holroyde:—

"Analysis of juice from seedling cane grown at Mackay. Name of cane, Kewensis:—

Total solid matter	-	-	22·75 per cent.
Total cane sugar	-	-	19·60 "
Total fruit sugar	-	-	1·93 "
Total density	-	-	12·60 "

"Analysis of juice from New Guinea cane, first ratoon. Age, about ten months; variety, Batoe:—

Total solid matter	-	-	20·80 per cent.
Total cane sugar	-	-	16·85 "
Total fruit sugar	-	-	2·56 "
Total density	-	-	11·50 "

"Deterioration by keeping the cane or juice has no doubt taken place to the extent of probably 2·7 per cent. of cane sugar."

The *Kew Bulletin* for 1894 (pp. 84-86) contains an account of the success obtained from seedling sugar-canes in British Guiana and Mauritius. Since this was published a fuller "Report on the Agricultural work in the Botanical Gardens, for the years 1891-92 (Demerara, 1894)," has been issued. This contains, pp. 11-26, an elaborate report of the further progress of the experiments in British Guiana. Four of the seedlings raised in 1889 are stated by the writer to be, "the richest canes in sucrose we have examined during our extended experience in this colony and the West Indies." Further, "six of the seedling canes raised in 1889 . . . gave results in excess of those yielded by the Bourbon in a year in which those canes had given results considerably above the average, and what is of great importance . . . is that . . . these results were due not to excessively high yields of canes per acre, but to the high saccharine richness of the canes."

The general conclusion arrived at that "the saccharine richness of a seedling cane is equally as problematical as the conjecture beforehand as to its colour or size" is in accordance with general experience.

The following correspondence has taken place with the Queensland Government with respect to the Kew seedling :--

AGENT GENERAL FOR QUEENSLAND to ROYAL GARDENS, KEW.

Queensland Government Office,
Westminster Chambers, 1, Victoria Street,
London, S.W., 10th August 1896.

SIR,

I HAVE the honour to enclose a copy of a letter which I have received from the Under Secretary of the Department of Agriculture, Brisbane, concerning some seedling sugar canes supplied by you in October 1890, and I shall feel obliged if you can furnish me with the information desired.

I have, &c.
(Signed) CHAS. S. DICKEN,
Acting Agent General.

The Director,
Royal Gardens, Kew.

[Enclosure.]

QUEENSLAND.

Department of Agriculture, Brisbane,
17th June 1896.

SIR,

IN December 1890 this Department received a Wardian case of seedling sugar canes from the Royal Gardens at Kew, as advised in your letter of 23rd October 1890. These seedlings, as you were informed, were planted in the State Nursery at Mackay, which at that time had only just been started. They have resulted in a cane that is so well thought of in the Mackay district and elsewhere, as being "first in sugar, a great stooler, and ratoonier, with fine broad healthy foliage, and having all the characteristics of a first-class cane, that all who have seen it here this season are captivated by its appearance." (*Report of Overseer, State Nursery.*) I shall be glad to know whether the Director of the Royal Gardens has received favourable reports from other places, and any further information concerning the cane whence the seedlings were derived that may be available. No name accompanied

the canes, and no information other than that the seedlings were raised from seed received from Barbados, accompanied your letter above referred to, so that pending a more authoritative common name, the cane is now known here generally by the name of *Kewensis*; I shall be glad, however, to entertain any correction in the nomenclature.

Great care has been taken in propagating the cane with the result that the department has been enabled to place cuttings, &c., with reliable persons in various parts, so that the variety is in a fair way to be spread over the sugar-growing districts, and each year increasing the available supply. The analysis [printed above] taken by the Colonial Sugar Refinery Company, at their laboratory, New Farm, Brisbane, from the juice of first ratoons about 10 months old, may be interesting, but in reading it you must remember that the canes had first of all to spend a few days in travelling from the Mackay nursery to the laboratory.

I have, &c.

(Signed)

PETER McLEAN,

The Agent General for Queensland,
Victoria Street, London, S.W.

Under Secretary.

ROYAL GARDENS, KEW, to QUEENSLAND GOVERNMENT OFFICE.

Royal Gardens, Kew,

August 12th, 1896.

SIR,

I HAVE the honour to acknowledge the receipt of your letter of August 10th, transmitting correspondence on the subject of seedling sugar-canes sent to Queensland in October 1890.

2. I have read the report with great interest and satisfaction. The results so far in other sugar-growing colonies of the attempt to obtain improved varieties of sugar-cane from seed have scarcely been so promising. In a case of this kind success is always a matter of pure chance. It is a piece of great good fortune that a cane of merit has been supplied to Queensland by this means.

3. The history of this important seedling cannot be carried very far. It was raised at Kew from seed obtained from the Botanic Station at Barbados. The origin of this is not certainly known. It was probably the Bourbon or Otaheite. But as the seedling can only be regarded as a seminal sport, the parentage of the seed is really immaterial.

4. The cane may be conveniently spoken of as the "Kew seedling" or, if preferred, as *Kewensis*.

I am, &c.

(Signed)

W. T. THISELTON-DYER.

C. Shortt Dicken, Esq., C.M.G.,

Queensland Government Office,

Westminster Chambers,

1, Victoria Street, S.W.

DXXIX.—CULTIVATION OF INDIA RUBBER IN ASSAM.

The Assam rubber plant (*Ficus elastica*, Roxb.) is a large evergreen tree found in damp forests from the base of the Sikkim Himalaya eastward to Assam and Arracan. Kurz remarks that it is frequent in Upper Burma where whole forests exist in the valley of Hookhoom. The Government of India has of late years attempted to establish regular plantations of rubber trees in Assam and Madras. A memorandum, by Mr. Gustav Mann, Conservator of Forests, Assam, describing the growth of trees from seeds, was given in the *Kew Bulletin*, 1891, pp. 100-2. In the *Kew Bulletin*, 1892, p. 68, it was stated that the imports into this country of Assam and Rangoon rubber in 1891 amounted to 350 tons.

The Government of India issued directions in May 1884 that for five years from that date the Assam plantations should be increased by 200 acres a year. Part of this extension it was recommended should be situated on higher ground than hitherto planted. At the same time, it was added, endeavours should be made to induce private persons to plant india-rubber trees on their estates, seedlings being offered by the Forest Department at cost price. It was also suggested that the experimental planting of *Ficus elastica*, as an epiphyte might with advantage be undertaken by the Forest Department. In a state of nature this plant generally reproduces itself in this way, and although the growth of the seedlings thus raised is slow at first, the trees are said to grow to much larger dimensions ultimately. This method of reproduction is moreover inexpensive, as the seedlings do not require any attention after they have once been deposited in the upper forks of trees. The Government of India also desired that in order to test the financial results of the cultivation of this rubber 50 mature trees should be experimentally tapped annually. In the reports of subsequent years the results of these experiments are fully given. The amount of rubber obtained showed a singular irregularity year by year. It varied so greatly that while the yield in one year was as much as 26 pounds per tree, it would fall in another year to a little over two pounds. The value in money depended, of course, on the market, but at an average price of 1s. 6d. per pound the extreme yield per tree varied from 39s. to 2s.

The fluctuations in the yield of one and the same tree in different years are, therefore, very considerable, and they remain up to the present inexplicable, "since the officers under whose personal supervision these experiments were made have not been able to find out any reasons for, or causes of, these very material fluctuations."

There is another point of practical importance. It is well known that *Ficus elastica* will grow with undiminished rapidity and luxuriance in situations remote from the hills, but in such localities it fails to yield caoutchouc. Hence, Mr. Mann concludes that no greater mistake could be made than to start plantations of this tree in the plains of Bengal. This is true also of many parts of the world where the tree has been introduced. In spite of the abundance of the tree under cultivation in the tropics of both the Old and New World it has nowhere proved valuable for the production of rubber except in the mountainous parts of Assam.

Owing to doubt as to the financial results of the cultivation of *Ficus elastica*, even in Assam, the work undertaken by the Government of India has latterly been suspended. In fact, no extensions have

been made since the year 1893-94. The total area of the plantations already established is estimated at about 2000 acres, but it is admitted that many parts are not fully stocked.

Great difficulty has been experienced in preserving the trees from illicit tapping by the natives even in the reserves. "It is rare to find a vigorous tree of any sort, and then it is invariably too old to yield rubber in quantity." The present position of the rubber industry in Assam is very fully discussed in a "*Note on an Inspection of Certain Forests in Assam*," by Mr. H. C. Hill, Officiating Inspector-General of Forests, dated the 31st March 1896. From this note the following extracts are taken:—

The continued destruction of naturally-grown rubber trees and the impossibility of preserving them.—The illicit tapping of trees in reserves, sparsely scattered over miles of almost impenetrable evergreen forest with an undergrowth of cane, is easily explained. The roughly collected impure rubber sells at a rupee a seer, and to obtain a number of seers which are interchangeable for 12 times their weight of rice at the nearest Koya's shop, a man has only to make his way to a tree, make cuts in the roots, and returning three days later collect his spoil. No system of inspection paths or staff of patrols would render protection effective over a block of forest of 200 square miles, such as the Bálipara and Charduar reserves, south and west of the Bhoroli river, with perhaps 10 or 20 trees to the square mile in the richest parts, even if men could be got to stay in the forests in the rainy season. Under existing arrangements the tapper works in the rains when all guards are withdrawn. The northern boundary abuts the Akha and Duffla hills and is uninhabited and trackless except for wild elephant paths, therefore the rubber once collected is easily carried across the line to be reimported as foreign produce. Formerly, when the right to collect rubber within Government forests other than reserves and to import from foreign territory was leased, gangs of Nepalese employed to collect rubber beyond the Inner Line defied the forest staff, and, assembling in numbers within the reserves, tapped everything before them. This began the destruction. Now, with fewer trees to work on, and licensed purchasers who pay the royalty of Rs. 12 on foreign rubber, illicit tapping goes on and the rubber is passed off to licensed purchasers as foreign rubber. The result is the continued destruction of the trees in reserves as well as in unclassed forests. And, if this is the state of things within the Inner Line, it may be safely concluded that the trees are being generally killed off across the Line, unless the reported religious regard for the tree in the Abor hills is affording it protection in that country. . . .

Plantations are the only means of assuring a continuous rubber supply.—The quantity of rubber exported from Assam annually at present amounts, in round numbers, to 3500 maunds, worth in Calcutta $3\frac{1}{2}$ lakhs of rupees (35,000L.). The Government royalty at Rs. 12 a maund amounts to Rs. 42,000 (4200L.) a year, and it will, I think, be admitted that, with a view to making this supply continuous it behoves Government to invest a fair proportion of these receipts, if they can be profitably invested, with this object in view. The only prospect of success, financial or other, seems to be in the direction of artificial plantations, where the trees can be concentrated on a limited area, the effective protection and exploitation of which will be possible.

Financial prospects of the plantations.—Can these plantations be expected to become a profitable investment? Hitherto the Government

of India, acting on the advice of the Inspector-General of Forests, who had consulted the local officers (Messrs. McKee and Campbell), decided in 1894, that the further extension of the plantation was not advisable because a considerable amount of expense would be incurred, and there was a great doubt whether the expenditure would prove remunerative; and further because, even if it were remunerative, many years must elapse before any profits could be obtained. My observations and an examination of the plantation and of the facts connected with the rubber supply of the future may not justify the expectation that the Government will reconsider their decision of 1894; but as both Mr. Smythies and Mr. Home, who have followed Mr. McKee as Conservator in Assam, are more hopeful of the financial prospects of the plantation and express doubts as to the wisdom of the orders passed, I venture to put forward a further forecast of results which it seems to me may be safely anticipated.

In the first place, the cost of establishing the plantation was estimated in 1879 at Rs. 36 per acre. Mr. McKee's estimate of 1893 was Rs. 50. Mr. Smythies was of opinion that Rs. 20 would suffice for planting out an acre, and adding Rs. 10 for maintenance the cost would be Rs. 30. Mr. Home's estimate is Rs. 40 an acre for planting with maintenance. In my opinion this cost-rate will suffice and should not be exceeded, and where open lands are planted, as in 1892-93, the cost may be estimated at Rs. 30. Mr. Home is able to show that, exclusive of Rs. 34,000 spent on experiments, the existing plantation has cost Rs. 50 per acre, and with the experience gained there can be little doubt but that operations will be cheaper in the future.

The prospective yield of the plantation is discussed at length in paragraphs 9 to 15 of Mr. McKee's report, but it would seem that some assumptions have been made too unfavourable to the plantation.

Trees have been put out in the older compartments 100 feet by 25 feet apart or to the number of 17 trees to the acre. In the younger compartments the trees are spaced 70 feet by 35 feet or 18 to the acre. It has been assumed that half the trees would disappear and only seven or eight remain per acre, on the score that the average lateral spread of 50 natural trees being 94 feet, they cover an average of 980 square yards. This is apparently a mistake for 770 square yards, and as now planted, the trees might have an average diameter of crown of

$\frac{70' + 35'}{2} = 53$ feet and cover 245 square yards. I think it may reasonably be held that more than eight trees, but with a less superficial area than $\frac{4840}{8} = 605$ square yards, will be permanently maintained.

But admitting that an acre with eight trees or more will only yield 40 seers at a tapping, which may be repeated every five years, the net value of the rubber is very much understated by Mr. McKee. Instead of Rs. 50 it should be Rs. 80 per maund, and the return per acre per annum thus becomes Rs. 16 instead of Rs. 10. If the Rs. 40 initial outlay are taken at 50 years at $3\frac{1}{2}$ per cent. compound interest to mount up to Rs. 220 and interest at $3\frac{1}{2}$ per cent. paid on this out of the Rs. 16, there would still be a net return of Rs. 8 per acre per annum.

In order to ascertain what prospect of yield the plantation gives at present, I had four good trees tapped. Their age is 18 or possibly 20 years, as the old trees date from 1875, and the first compartments were only successfully planted in their present completeness in 1877-8. They yielded respectively 23, 21, 11 and 48 chittacks (approximately equivalent to 3, 3, $1\frac{1}{2}$ and 6 lbs.).

This was valued locally at Rs. 97 a maund, and allowing for some further drying and a fair rate for collection, the net value may be taken at Rs. 80 (a little over 1s. per pound).

The rubber was sent to Dr. Watt with a view to his obtaining an independent valuation in Calcutta. The result of this valuation is Rs. 105 to Rs. 108, Rs. 100 to Rs. 105, Rs. 110 to Rs. 115, Rs. 110 to 112 respectively, per bazaar maund landed in Calcutta (equivalent to an average price of 1s. 6d. per lb.).

One man taps three trees in a day or collects the rubber from two trees, so that 15 men would tap and collect the rubber from an acre containing 18 trees. Allowing a margin, the collection should be done for Rs. 10 a maund. The yield varies with the spread of the crowns and the more or less openness of the situation. The smallest yield was obtained from an enclosed tree in the middle of the compartment: the largest from a tree open on two sides situated on the bank of the Mansiri river. Previous tappings had been confined to the least vigorous and most suppressed trees in the lines, and hence the rubber obtained gave no indication of the yield of the plantation, the dominant vigorous trees of which alone yield rubber freely.

I think the yield obtained from these few trees justifies the assumption that 20 seers (41 lbs.) could even now be obtained from an acre, and that it is reasonable to suppose a maund will be readily obtained at or before the age of 50 years, and that Rs. 16 per acre per annum can be counted upon.

Extension of plantation work.—If these views are accepted, there would seem to be a good case for extending the plantation by 250 acres a year, at a cost of Rs. 10,000, for the next 12 years at least. By this time it will cover an area of 5000 acres, the prospective yield of which would be, even according to Mr. McKee's estimate, 1000 maunds of rubber per annum, adding a net income of at least Rs. 80,000 to the forest revenues of the province.

Cost to Government and the possibility of increasing the duty.—As already shown, Government is only required to forego 25 per cent. of the revenue it is now deriving from the extermination of the natural rubber trees.

Considering that men are ready to pay up to Rs. 38 a maund for rubber collected from the forests in the Tezpur district, with a guaranteed yield of 168 maunds from one of the two mahals (eastern) into which the district has been divided, it may be desirable to raise the royalty from Rs. 12 to Rs. 20 a maund. This would still leave an ample margin for profit, since the cost of collection and carriage varies from Rs. 16-8 in the Garo Hills to Rs. 30 paid by mahaldars.

DXXX.—GERMAN COLONIES IN TROPICAL AFRICA AND THE PACIFIC.

Some particulars respecting the development of agriculture in German Tropical Africa were given in the *Kew Bulletin*, 1894, (pp. 410-412). The Foreign Office has now published a further report (Miscellaneous Series, No. 402) on the "German Colonies in Africa and the South Pacific," by Mr. Martin Le M. Gosselin, C.B., H.M. Chargé d'Affaires at Berlin.

The Colonies dealt with comprise :—

- (1.) Togoland lying east of the British Colony of the Gold Coast ;
- (2.) The Cameroons in the Bay of Biafra opposite the Spanish Island of Fernando Po ;
- (3.) German South-West Africa between the Portuguese Colony of Angola and Cape Colony ;
- (4.) German East Africa extending from Cape Delgado northward to Wanga, nearly opposite the island of Pemba and reaching inland to Lakes Tanganyika and Victoria Nyanza ;
- (5.) German New Guinea or Kaiser Wilhelmsland, including Bismarck Archipelago ; and
- (6.) Marshall Islands, a small group lying north of the Caroline and Gilbert Islands in the latitude of the Philippines.

The following table will show the extent and trade of these Colonies :—

Colony.	Area. Square Kiloms.	White Population.	Volume of Trade. (Imports and Exports combined.)
			£
Togoland - - - - -	60,000	96	256,751
Cameroons - - - - -	495,000	230	520,316
German South-West Africa - - -	835,100	1,114	101,303
German East Africa - - - - -	995,000	600	593,322
German New Guinea - - - - -	250,000	198	—
Marshall Islands - - - - -	400	81	—
Total - - - - -	2,635,500 = 1,016,782 English square miles.	2,319	1,471,692

Of these colonies Togoland is the only one that so far pays it way.

In the work of maintaining the government of the other colonies there is estimated to be a deficit for the year 1896–7 of 473,502*l.*, to be met by Imperial grants in aid.

The German colonies have not as yet attracted many settlers from the Fatherland. The opinion is expressed in the report that they are still in a great measure in the position of undeveloped estates of unknown value ; a great deal has already been done with the most praiseworthy perseverance to open up the countries entrusted to German rule and civilisation, but, except in parts of South-west Africa, it appears certain that none of the colonies are suitable for actual colonisation by Europeans. Manual work can be supervised and directed but not undertaken by the white settler. They may and probably will become great trade centres for the development of German transmarine trade, but will not serve as agricultural colonies in which the surplus population of Germany can be absorbed.

I.—TOGOLAND.

This was the earliest of the German possessions on the coast of West Africa. The white population is almost entirely German, consisting of

22 officials, 25 traders, and 22 missionaries. The following particulars are given of the plants cultivated in the colony:—

“Amongst the trees and shrubs acquired some years since from the botanical garden at Lagos, the Annatto plant, *Bixa Orellana*, yielding a red dye, and various sorts of *Eucalyptus*, have thriven very well. The cocoa-nut plantations at Lome, Bagida, and Porto Seguro are also thriving. Attention is being paid to the cultivation of indiarubber trees and it is anticipated that the imported *Manihot Glazovii* will do better than the native sorts.

“The Liberian coffee trees do well, and the coffee plantations have been largely extended during the 12 months, July, 1894, to June, 1895, one native firm (the Brothers Almeida) having now 25,000 trees and 50,000 seedlings. Some 300 kilos. of coffee were exported as a sample crop, and realised at Bremen 1s. 7d. the kilo. This year the same firm hope to export 2 tons.

“At Klein-Popo 30,000 coffee trees have been planted, about one-fifth of which bore fruit this year, and a small consignment (60 kilos.) was exported. The Arabian coffee trees have been attacked by disease, which does not, however, affect the Liberian trees, even when in the closest proximity.

“Many European vegetables are doing fairly well in the Government gardens at Sebbe (endives, carrots, cabbages, celery, radishes, &c.), and some specimens of the so-called Otaheite potato (*Dioscorea sativa*) have been obtained from the Gold Coast botanical gardens.”

The following table shows the trade returns of the principal articles exported during the last two financial years—

Articles.		Quantity.	
		1894-95.	1893-94.
Palm nuts - - - -	Kilos -	8,428,159	7,095,893
Palm oil - - - -	Litres -	2,766,132	2,821,093
Gum - - - -	Kilos -	41,183	23,349

The export of gum has nearly doubled itself, that of palm nuts shows an increase of over 1,000,000 kilos., while the amount of palm oil has somewhat decreased.

“The total value of goods exported (July, 1894, to June, 1895) amounted to 107,317l.”

II.—CAMEROONS.

This has a total area of 495,000 square kilometres, equal to 190,973 English square miles, or about the size of Spain.

This immense tract has a white population almost stationary at about 230.

The principal articles cultivated for food, and the forest products exported, are noticed in the following extracts:—

“Many European vegetables (cabbage, carrots, salad, beans, and cucumbers, &c.) do well in the outskirts of Kamerun, and Europeans will soon be able to dispense with tinned (imported) vegetables.

"The trade in the chief products of the Cameroons, oil, palm nuts, indiarubber, and ivory, is still suffering from the fall in prices quoted on the European markets for such goods. A gradual change is being effected in the inland trade; formerly the export goods passed from tribe to tribe, and eventually only reached the European firms through the native middlemen on the coast; now the firms despatch caravans every month from eight to 10 days' march into the interior, and exchange European imports for ivory and indiarubber.

"The unsatisfactory middleman is thus being abolished, which is doubtless an advantage; but the cost price is much the same now as formerly, in consequence of the expense in carriers, almost all Wey-men from Liberia.

"The botanical gardens at Victoria continue to render valuable service; the Arabian coffee tree thrives very well, while the Liberian coffee tree suffers—especially in the rainy season—from a mouldy growth. (As stated above, in the neighbouring colony of Togoland, it is the Liberian tree that thrives, and the Arabian that has been attacked by disease.) Clove trees (*Caryophyllus aromaticus*) do well, and are already 50 centimetres high. Ten Para gum trees (*Hevea brasiliensis*), which yield the best indiarubber, have been planted, and are thriving admirably. Ginger does well, the first crop, 5½ centners, having been sent to Hamburg, and realised good prices. Large plantations of Jamaican and Canton ginger will consequently be made this year. The nutmeg (*Myristica moschata*) has not thriven, probably on account of the dry climate. On the other hand, black pepper does very well.

"During the year the botanical garden shipped:—

Articles.	Quantity.	Value.
	Kilos.	£
Cocoa - - - - -	3,101	208
Coffee - - - - -	533	40
Ginger - - - - -	270	5
Coffee and vanilla samples - - -	11·5	1
Total - - - - -	—	254

"The garden further supplied a great quantity of seeds to the various European planters and-missions.

"The Bibundi plantation, worked by three whites and 240 coloured labourers, has already 44,500 cocoa trees. In 1893-94 the cocoa crop was 78 centners; in 1894-95, 200 centners. The tobacco crop, on the contrary, fell off from 110 centners in the former to 60 centners in the latter year. The Havannah tobacco plants, the best in quality, do not yield so heavy a crop as the Surinam plants.

"Similar progress is reported from the other plantations.

"The value of goods exported during 1894-95 amounted to 204,056*l.*, as compared with 238,707*l.* in the previous year, showing the diminution of 34,651*l.*

"The following table shows the details of export during the years 1893-94 and 1894-95 :—

Year.	Palm Oil.	Palm Nuts.	India-rubber.	Ivory.	Ebony.	Cocoa.
	Litres.	Kilos.	Kilos.	Kilos.	Kilos.	Kilos.
1893-94 - -	3,600,139	5,960,399	448,883	30,484	507,041	110,905
1894-95 - -	3,362,082	5,837,608	343,150	40,822	479,385	120,069
Increase or decrease	- 238,057	- 122,791	- 105,733	+ 10,338	- 27,656	+ 9,164

"The fall is attributed partly to the bad prices obtained in European markets for West African produce, and partly to six months of exceptionally dry weather. As illustrating the first cause, it is recorded that, on January 8, 1895, a ton of Cameroons oil realised in Liverpool only 20*l.*, as compared with 23*l.* on the same day in 1894; similarly palm nuts realised at the same dates and market 9*l.* 11*s.* 3*d.* and 11*l.* 10*s.*

"So keen is the competition between the several export firms, that in spite of the fall in prices, they do not dare to reduce the purchase prices paid to the natives. Until the firms pull better together, the report sees no chance in reducing the purchase prices to which the natives are accustomed."

III.—GERMAN SOUTH-WEST AFRICA.

The area of this Colony is 835,100 square kiloms. or nearly twice the size of the Cameroons. There are 780 Germans, of whom about 500 are in uniform. The British subjects are nearly as numerous as the German, with a sprinkling of Trek and Transvaal Boers.

"EXPORTS from Walfish Bay to Cape Town of Articles over the Value of 1000 marks (50*l.*).

Articles.	Value.
	£
Narrah kernels - - - - - -	695
Hides - - - - - -	1,689
Ostrich feathers - - - - - -	1,551
Goat skins - - - - - -	839

The "Narrah" kernels above mentioned are the seeds of the Naras plant (*Acanthosicyos horrida*, Welw.), a cucurbit, yielding an edible fruit, covering large tracts in Angola and Dammaraland.

IV.—GERMAN EAST AFRICA.

The area is nearly a million square kiloms., or 383,873 square English miles. This is undoubtedly the most valuable of any of the German Colonies, but it is still in a very undeveloped state. The races to be governed are Negroes, Arabs, and East Indians. In some localities

the British East Indians are far in excess of all the other coloured people. The following particulars are furnished in the Report :—

“The effects of the visitation of locusts in 1893–94 were still visible in the year under review. Many formerly fruitful districts were completely devastated; the locusts especially attacking rice, Indian millet, and maize; the natives are now advised to replace these crops with plants which the locusts do not touch, such as manioc, sweet potatoes, and various sorts of beans. In the non-devastated regions, last year’s harvest has been good.

“Cattle rearing has not materially improved; whether the rinderpest is partly the cause of this is not certain; but undoubtedly the locusts and the famine have retarded progress. Good fodder could only be obtained from the islands of Mafia and Kilwa-Kissiwani, and from the Kilimanjaro highlands.

“*Plantations.*—The reports of the cocoa-nut, india-rubber, vanilla, and coffee plantations, were generally satisfactory.

“The cocoa plantations of the German East Africa Company at Moa and Yassini, embrace some 18 square kiloms.; 80,000 to 85,000 cocoa-nut palms have been planted, besides a quantity of seedlings, and the Director calculates that by July 1896, 500,000 trees will have been planted out. The same Company’s coffee plantations, Derema and Nguelo, at Handei, in the Usambara Hills, yielded last harvest a crop of about 50,000 kiloms., and it is said of excellent quality. At Derema in June 1895, there were between 150,000 and 160,000 Arabian coffee trees, and some thousands of Liberian trees. At Nguelo some 350,000 trees. From 600 to 700 labourers are employed, amongst them 200 Chinese and Malays. The *Hemileia vastatrix* appeared in 1893–94, but fortunately has not hitherto done much damage. Dr. Heinsen, the botanist, specially sent to East Africa to stamp out this disease, has tried several means of doing so (the report does not specify them), nor is it yet known whether the experiments have succeeded.

“200 acres of land have been planted with tobacco at Lewe, and 2500 with coffee; but it is not intended to plant more tobacco, as the quality does not come up to the mark. From 100 to 120 Chinese and Javanese are employed at Lewe, besides 100 (and in the busy season 400) Bondei men. The health of the Asiatic coolies is said to be good.

“The cotton plantations at Kikogwe, though thriving well, do not pay, both on account of Indian competition, and of the heavy fall in the prices realised in Europe. A pound of cotton, equal to the best Texas cotton, only fetched in Hamburg 26 pf. ($2\frac{1}{2}d.$), while formerly from 43 to 47 pf. were constantly realised.

“In the Bagamoyo district, the prosperous vanilla plantations of the Fathers of the Holy Ghost, started many years ago, deserve a passing notice; but these plantations are of course exceptional, being worked by the pupils, who are fed, clothed, and housed at the mission’s expense.

“Sugar plantations are chiefly to be found in the Pangani Valley.

“*Government assistance to agriculture.*—The Government will doubtless do much in the way of experimental cultivation, now that a new agricultural department is being organised, but a good deal has already been done in this direction.

“For instance—

“1. Every half-year a quantity of vegetable seeds are supplied to all stations, both inland and on the coast, inhabited by Europeans. Inland,

nearly all European vegetables do well. Wheat has been successfully cultivated at Tabora: 600 kiloms. inland. Sample sacks of Tabora wheat, quite recently forwarded to Berlin, are said to have made excellent flour, quality and colour good, and very nutritious. The stations are further supplied with all tropical fruits, and with such trees as are likely to thrive (cedar, *Pinus excelsa*, acacia, and eucalyptus). The assistance rendered in this respect by the Director of the Indian Forests Department, by the botanical gardens at Natal, Rockhampton (Queensland), and Calcutta, is gratefully noticed in the report, and the thanks of the Government are expressly conveyed to these and other foreign and German benefactors.

"2. A portion of the special grant of 2500*l.* voted in June, 1895, by the Reichstag for the relief of the famine, as well as the funds collected at Zanzibar for the same end, was expended by the Administration in providing the natives with grain and seeds (maize, rice, beans, and ground-nuts), partly gratuitously, partly under the condition of returning double the grant after the first good harvest.

"3. An experimental plantation, 80 acres in extent, of Liberian coffee and tobacco, has been started at Mohorra, south of the Rufidji Delta.

"4. Silk culture has been started at Dar-es-Salaam, and it is hoped to obtain Indian experts to direct the experiment. 'Unfortunately the efforts of the Consulate at Bombay to find such people have been as yet fruitless, but it is hoped they may soon be engaged.'

"5. An experimental garden has also been started at Dar-es-Salaam, and an interesting table is annexed to the East African report, showing the countries of origin and dates of arrival, planting, and sprouting of no less than 273 different sorts of plants, together with a further list of those plants which would appear to do best. These tabular statements would doubtless be of great service to any horticultural or arboricultural undertaking on the East Coast.

"6. A station has been founded in the Upper Usambara Hills, to test whether the Highlands could be utilised for German colonisation.

"7. A forestry ordinance was issued by Major von Wissman in October 1895, for protecting the woods in the Usambara district. According to this regulation, the woods for 150 metres wide on the hill ridges can only be touched by special permission of the Government. Hill-sides above an angle of from 45 to 50 degrees may not, under any circumstances, be disafforested. In the valleys, woods are to be left 30 metres wide, every 600 metres, at right angles with the lay of the valley; along the brooks the woods are to be left for a space of 50 metres wide (either on both or on one side). Intentional contraventions of the above are punishable with fines up to 6000 rs., or 3 months imprisonment; unintentional contraventions with fines up to 1000 rs.

"8. By an Ordinance, dated July, 1894, the then Governor, Herr von Schele, forbade the preparation of 'tembo' (or palm wine) in East Africa, in order to prevent as far as possible the damage done to the cultivation of palms by the preparation of this drink. Contraventions were punishable by fines up to 50rs, or 1 month's imprisonment.

"This Ordinance, being found to be unworkable, was abrogated in October 1895, but the district officials are instructed to do all in their power to discourage the preparation of 'tembo'; and it is suggested that the sale of this drink should only be allowed to duly authorised persons who should have to take out a license for the same.

"The commercial state of the Colony in 1894-95 was 'not unfavourable,' when the locust plague, and consequent famine, and the fall in the rate of exchange on the rupee are taken into consideration."

“The result of the locust plague is all too plainly to be seen in the export returns of food stuffs:—

Articles.	Value in 1000 Dollars.		
	1892.	1893.	1894.
Rice, unpeeled - - -	33	35	9
„ peeled - - -	60	121	16
Maize - - -	6	7	—
Negro corn (matama and inawele)	56	84	53
Chiroko - - -	3	4	2

“The same decrease is noticeable in the report returns of cattle, sugar-syrup, and molasses.

“On the other hand, exports not affected by locusts show an increase:—

Articles.	Value in 1000 Dollars.		
	1892.	1893.	1894.
Raw caoutchouc - - -	211	232	247
Cocoa-nuts - - -	31	36	44
Sesame - - -	47	44	80
Tobacco - - -	37	30	101
Grass for plaiting - - -	9	13	24

“The only exception is copra, the quantity exported in 1894 being 30,000 dols. less than in 1893.

“The great volume of the East coast trade still finds its way to Zanzibar. According to the returns drawn up there the value of the goods imported into the island in 1894 from the German coast amounted to no less than 3,980,390 rs., and the goods exported thence to the German coast to 3,739,339 rs.”

[The following extract from a despatch to the Foreign Office, gives the most recent account of the progress made in the cultivation of Tropical staples in German East Africa.

MR. GOSSELIN to the MARQUESS OF SALISBURY.

(No. 120. Africa.)

MY LORD,

Berlin, July 9, 1896.

THE German East Africa Company have recently issued their Annual Report for 1895.

The Handei Hills coffee plantations are doing well, and have withstood the ravages of the *Hemileia vastatrix* fairly well, and the first harvest (1895-96) realised some 1700 centners; the best quality was sold on the average for 1.10 marks per $\frac{1}{2}$ kilog. (the duty being paid by the purchasers). A great increase is anticipated in the next harvest, as a number of newly-planted trees will make a return for the first time. From 500,000 to 600,000 coffee trees are already planted, without counting some hundred thousands of cuttings.

Tea plants are doing well at Derema, but it is too early yet to give an opinion as to the result. If the cultivation of tea is to succeed on the East African littoral it will, says the Report, be necessary to obtain the assistance of Chinese and Javanese coolies, and the hope is expressed that the Imperial Government will facilitate the importation of coolie labour from East Apia.

Some former Wanyamwezi and Wasukuma porters have recently done well in the plantations, and an agent has been dispatched to the interior to enlist labourers for the company and other agriculturists in the Usambara district.

The cocoa cultivation at Derema has not been a success, the plantations being too high up on the hills. The cocoa plantations at Muoa, where some 3600 hectares have been planted close to the sea, are thriving well.

At Kikogwe the outlook is less satisfactory; the market price of cotton, being now so low it has been found necessary to supplement the cotton plantations with other crops, notably, Liberian coffee, Chiroko beans, maize, Mtama millet, and it is anticipated that little by little the cotton should be replaced by coffee, cocoa, and Sisal hemp. Mr. Cowley, who started the Handei Hills plantations, has been appointed manager at Muoa.

I am, &c.

The Marquess of Salisbury, K.G.]

M. LE M. GOSSELIN.

V.--KAISER WILHELMSLAND.

This includes German New Guinea and the Bismarck Archipelago, with an estimated area of 250,000 square kilometres or about one half the size of the Cameroons.

"The great event in the history of the colony this year is the Bill laid this session empowering the Imperial Government to take over the administration of Kaiser Wilhelmsland.

"The following notes are taken from the Memorandum submitted to the Reichstag last month (May, 1896) in support of this measure.

"In the three West African Colonies sovereign rights have been exercised ever since the annexation by the Emperor in the name of the Empire.

"In East Africa, the German East Africa Company acquired sovereign rights by the Imperial Letter of Protection of February 27, 1885; but these were given up in 1890, and the sovereignty of the Protectorate was vested directly in the Empire.

"In New Guinea, the sovereignty was accorded to the New Guinea Company by the Imperial Letters of Protection of May, 1885, and December, 1886; the Company was acknowledged as a Corporation, and acquired juridical rights in May, 1886, and, except from November, 1889, to September, 1892, has since carried on the government of the scattered colony.

"During the 1889-92 interval a special arrangement was tried, under which the Government found the officials, whilst the company paid the salaries; but the plan did not work well, and, in September, 1892, the company again undertook the administration.

"The company have found great difficulty in recruiting their staff, and finding people able to act as officials, and, at the same time, possessing that practical knowledge required for trading or plantation purposes. This was specially the case when, through death or illness, an appointment had to be suddenly filled up. Vacancies were thus left unprovided for months, to the manifest disadvantage of all concerned.

"The official memorandum proceeds to give a glowing account of the fertility and richness of the whole colony, of the abundant water supply, and of the success attained in the cotton plantations.

"The fauna of the island is remarkably poor in mammals, very rich in birds. Beasts of prey and poisonous reptiles are unknown. The natives rear pigs and dogs, but no other domestic animals were known till the arrival of the Germans.

"*Cotton Crops.*—The cotton crops on the Gazelle Peninsula were good, and of excellent quality. In the Herbertshöhe plantations, 60 bales (about 25,000 lbs.) were ready for exportation in July, 1895; in the Ralum plantation, 120 bales (41,000 lbs.), and the crop was by no means ingathered when the report was written."

VI.—MARSHALL ISLANDS.

This remote group of islands is situated almost in the middle of the Pacific. It is of very slight commercial importance, but the account given of a visit to Nauru by the Imperial Administrator furnishes some facts of interest.

"The chief occupation of the natives is the collection and preparation of copra, the staple export of the archipelago. They are excellent fishermen and swimmers. The women make preserves, mats, and other such articles. Many of the men have become very serviceable sailors, so much so that the vessels of the Jaluit Company, with the exception of the captains and pilots, are exclusively manned by the Marshall Islanders. The boldness of the crews of the native schooners, navigated in the open seas without any nautical instruments, by the help of the most primitive and, to Europeans, unintelligible of nautical charts, is astonishing. On land, and as domestic servants, the natives are less satisfactory, though even here an improvement is visible. Want of application and perseverance is, after all, a necessary outcome of the nomad lives they have hitherto led.

"The old patriarchal system still prevails amongst the natives. On the other hand, by contact with the whites, they have lost many of their primitive originalities, most of all in Jaluit, where the old-fashioned grass-coats and hair-tufts are now seldom to be seen. The old war-drums of sharks-skins, formerly beaten by the native women, are things of the past, and are now eagerly sought for by collectors of curiosities. The natives of the Rataks, of the northern Raliks, and especially of Nauru, have kept up more of the old habits and customs, and the love of fighting. The fact that peace has been maintained, in spite of this feeling, throughout the colony is due, not so much to a change in the native character, as to a whole series of regulations, amongst which, in the foremost place, should be reckoned the prohibition of the sale of arms and spirits. Another measure which has tended greatly to preserving the peace is the decree forbidding the selling of goods to natives on credit.

"The price of food-stuffs is high, due to the remoteness of the islands, to the dearness of labour, and to the hitherto prevalent system of allowing long credit.

"*Products.*—The indigenous products of the islands were limited to cocoa and other nuts, pandanus, bread-fruit, taro, arrowroot, bananas, and various goods.

"The natives are learning the value of the bananas and melons, but the place once held by the cocoa-tree as the staff of life is being gradually

replaced by imported rice and preserves. Last year's yield of copra was very rich; the natives have planted young trees, in accordance with regulation of September, 1894, which should bear a full crop in some 10 years' time.

"The plantation at Likieb, the joint property of an American, a German, and a Portuguese, yielded 210,000 lbs. copra in 1894-95, and 25 fresh hectares were planted.

"Attached to the plantation is a small ship-building yard, which turns out excellent sailing-boats used by the Marshall, Caroline, and Gilbert natives. The material has all to be imported by the Jaluit Company 'as the cocoa-nut wood breaks like glass.'

"The Jaluit Company's plantations at Providence and Killi are also thriving.

"The total copra yield amounted during the year 1894-95, to 4,730,259 English lbs. as compared with 4,767,169 English lbs. in the previous year. Almost all the isles showed an increased yield excepting Nauru, where, on account of the drought, the crop fell from 421,000 lbs. to only 31,509 lbs.

"There are three experimental gardens at Jaluit, where several European vegetables (such as salad, tomatos, cucumbers, radishes, &c.) do well, but good soil is so scarce, having to be imported as ballast, that extensive cultivation is out of the question.

"Pigs are the only animals reared for food purposes on the islands, there being no fodder for cattle or sheep; cattle and sheep are occasionally imported, but have to be killed at once for want of green food. There is no wild game."

"*Nauru*.—The Imperial Administrator ('Kaiserlicher Landeshauptmann'), Dr. Irmer, made a voyage to Nauru (formerly known as Pleasant Island) in August, 1894, and his report furnishes some interesting information on the inhabitants of this isolated spot.

"There is no harbour, and ships cannot even anchor off the shore, the coral reefs being unusually steep.

"Nauru, lying almost on the equator fully five degrees south of Ebon Isle, the southernmost of the Ralik Marshall Isles, is reported to be, without doubt, the most beautiful and, in rainy years, the most fruitful of the whole protectorate.

"From January, 1892, to shortly before the Governor's arrival, no rain to speak of had fallen, and the copra harvest of 1893 was consequently lost. Some of the cocoa-nut trees produce the almost incredible number of from 1200 to 1500 cocoa-nuts. The distress in consequence of the drought was so great that the copra tax had to be suspended, and the trading licenses reduced by half.

"The i-let, only some 10 marine miles in circumference, rises in terraces of coral formation from the sea, the highest ground being some 50 to 60 metres from the sea-level.

"As a guide to ships a flag-staff has been erected on the highest point. The high ground is wooded. Near the centre is a fish-pond with brackish water, surrounded by a palm grove of magnificent trees from 80 to 100 feet high.

"The picturesque village lies close to the shore, half being built on piles in the sea.

"Attached to each house is an inclosure with tame sea-swallows and other large marine birds. The feathers were formerly exported to the Marshall Isles to adorn the hair and ears of the natives, and dress their canoes, but this trade has now ceased, the birds being still kept to amuse the children.

"Pigs are also to be found and dogs, the latter are not kept for protection, but as dainty morsels at great feasts.

"The sea inside the reef, some 15 feet deep, is very rich in mud, and is divided by moles separating each marine property. The fish, hardly the length of a finger when caught, are fed up till they attain the size of a fat herring, and are then eaten raw, and they are said to be delicious.

"Behind the village is a deep cavern, access to which is gained by a shaft some 70 feet deep by means of ropes; below is a fresh-water lake domed in by a stalactite formation. Beyond this cave is a further abyss of unknown depth and extent. The cave, which extends far under the sea, will, when explored, probably yield much of interest to marine life and science.

"The presence of singing-birds was noted with delight by those coming from the Marshall Isles where none such exist. An attempt to import them to the other isles failed, as they die at once in captivity."

DXXXI.—MISCELLANEOUS NOTES.

MR. MARMADUKE ALEXANDER LAWSON, M.A., F.L.S., Government Botanist and Director of Cinchona Plantations to the Madras Government, died at Madras on February 14th last. From 1868 to 1882 he held the posts (now divided) of Sherardian Professor of Botany and Sibthorpean Professor of Rural Economy in the University of Oxford. In that year he was appointed, on the recommendation of Kew, by the Secretary of State for India in Council, Director of Government Cinchona Plantations, Parks, and Gardens, Nilgiris.

In 1885 a Botanical Department for the Presidency was created, and Mr. Lawson was appointed its head, with the title of Government Botanist and Director of Cinchona Plantations.

The official record by the Acting Government Botanist, and the minutes of the Madras Government (dated July 23rd) are given below.

EXTRACTS FROM ANNUAL ADMINISTRATION REPORT ON THE GOVERNMENT CINCHONA DEPARTMENT, NILGIRIS, for the Year 1895-6.

It is with great regret that the death of Mr. M. A. Lawson, Government Botanist and Director of the Cinchona Plantations, has to be recorded. Mr. Lawson assumed charge of the Cinchona Plantations and Government Gardens and Parks on the 18th June 1883, and the designation of Government Botanist and Director was given to him on the 1st April 1886. Mr. Lawson had unusual ability, which he exhibited in every department of his office. In January 1895 he intimated his intention to retire from service, and at the close of the year his health, which had been most robust during the whole of his Indian career, began to fail. In February last he reluctantly placed himself under medical care, and was removed to Madras, where he died after an operation on the 14th February 1896 (p. 9).

His Excellency the Governor in Council desires to record his high appreciation of the work done by the late Mr. Lawson as Director of the Government Cinchona Plantations during a period of over 12 years. From the report of Dr. King, who has inspected the plantations on two occasions prior to 1884, it is clear that their condition has greatly improved during Mr. Lawson's tenure of office, a result which is to be ascribed to his administration (p. 23).

MR. JOHN CHRISTOPHER WILLIS has been appointed on the recommendation of Kew to succeed to the post vacated by Dr. Trimen as Director of the Botanical Department, Ceylon. Mr. Willis is M.A. of Gonville and Caius College, Cambridge, and held for three years from 1890, the Frank Stuart Studentship for botanical research. At the time of his appointment he filled the posts of Senior Assistant to the Regius Professor of Botany in the University of Glasgow, and of Lecturer in Botany at Queen Margaret's College in that University. Mr. Willis left England for Ceylon on the 21st August last.

MR. GEORGE HERBERT CAVE, a member of the gardening staff at Kew, has been appointed by the Secretary of State for India in Council, a gardener on probation on the staff of the Royal Botanic Gardens at Calcutta. Mr. Cave had served as sub-foreman in the Propagating Pits. He left London for Calcutta on the 18th September last.

Botanical Magazine for August.—All the drawings were made from plants cultivated at Kew. *Sansevieria roxburghiana*, native of the East Indies, is interesting as a fibre-yielding plant. It was presented to Kew by Messrs. James Veitch and Sons. *Cyrtanthus Huttoni* has been recently introduced from Cape Colony. The Kew plants were raised from seeds received from the Edinburgh Botanic Garden in 1892. *Sarcochilus hainanensis*, an orchidaceous plant from the Island of Hainan, was sent to Kew in 1894 by Mr. Ford, the Superintendent of the Botanical Gardens, Hong Kong. *Adonis amurensis* is a native of Manchuria and Japan. It is chiefly noteworthy for its handsome foliage. *Solanum cernuum*, a native of South Brazil, is about eight feet high, with large leaves and white flowers.

Botanical Magazine for September.—The plants figured are: *Chonemorpha macrophylla*, *Dendrobium Leonis*, *Bauhinia Galpini*, *Rhododendron Smirnovi*, and *Celmisia Munroi*, all being cultivated at Kew. The *Chonemorpha* is a vigorous climber, native of India and the Malay Islands. It was raised from seeds received from the Royal Botanic Gardens, Calcutta, in 1884. The stem, when cut, yields a milky fluid, which Mr. Gamble considers "a good sort of Caoutchouc." The *Dendrobium* is a curious species from the Malay Peninsula, whence it was first introduced into this country sixty years ago. The Kew plants were obtained from Mr. C. Curtis, F.L.S., Assistant Superintendent of the Garden and Forest Department, Penang. *Bauhinia Galpini*, flowered for the first time at Kew in 1895. It is a native of the Transvaal, where it was first discovered by Mr. W. Nelson, at Dorn Spruit Spelunken, in 1880. The *Rhododendron* is a handsome species from Trans-Caucasia, and was obtained from seeds received at Kew from Dr. Regel in 1866. *Celmisia Munroi*, native of New Zealand, was introduced by Messrs. J. Veitch and Sons. It is one of the finest species of the genus.

Flora Capensis.—The publication of the first part of Vol. VI. has already been noticed (p. 124). Part II. has since been issued with the following prefatory note by the Director :—

The second part of the sixth volume of the *Flora Capensis* needs but a few words of introduction. Like the first, it is the work of Mr. J. G.

Baker, F.R.S., the keeper of the Herbarium and Library of the Royal Gardens, Kew. It contains the continuation of the *Amaryllideæ* and part of the *Liliaceæ*, to the completion of which the whole of the third and concluding part will be devoted.

Most of the genera described include species of great horticultural interest. This is especially the case with *Crinum*, *Nerine*, *Cyrtanthus*, and *Hæmanthus*, which belong to the former family, and with *Asparagus*, *Kniphofia*, *Gasteria*, *Aloe*, and *Haworthia*, which belong to the latter.

Two points suggest some remark. A considerable number of species appear never to have been collected but once. Many are still only known from descriptions and figures published in the last century, and are unrepresented in herbaria. It is difficult, however, to believe that any are really extinct. The fact is more probably accounted for by the extremely local limitation of species in South Africa, which is hardly paralleled in this respect by any other flora in the world.

In the case of succulent genera such as *Aloe* and *Haworthia*, herbarium specimens are lamentably deficient. But Mr. Baker has had the advantage of having had under observation for years the collection of succulent plants at Kew, which in extent is undoubtedly unique. Many of these have been, in all probability, under cultivation at Kew since their introduction in the last century. The advantage of consulting living specimens is of peculiar advantage in describing the Petaloid Monocotyledons. But in the case of the succulent genera, it may be safely said that, without it, the task would not be possible at all. Unfortunately when the majority of these plants were introduced, little importance was attached to their exact localisation; and this, therefore, for the present, must remain for the most part undetermined.

I have again to express my obligation to Mr. N. E. Brown, and to Mr. C. H. Wright, assistants in the Herbarium, for their valuable assistance in the work of passing the sheets through the press. And I must remedy an omission in expressing my thanks to the well-known South African botanist, Mr. H. Bolus, F.L.S., for great assistance in revising the very intricate topography.

W. T. T. D.

Kew, August 1896.

Hand-List of Trees and Shrubs. Part ii.—An account of the purpose and scope of this publication was given in the notice of Part I. in the *Kew Bulletin* for 1895 (pp. 40-42). The present part (Gamopetalæ to Monocotyledons) completes the catalogue of the ligneous plants (excluding conifers, which form a separate hand-list), grown in the open air in the arboretum of the Royal Gardens. In the nomenclature of hardy bamboos Kew has to acknowledge the kind assistance of A. B. Freeman-Mitford, Esq., C.B., of Batsford Park, Moreton-in-Marsh, who has made them a special study. Anyone interested in the cultivation of these beautiful shrubs cannot do better than procure Mr. Freeman-Mitford's admirable volume, "The Bamboo Garden."

Donation to the Herbarium.—Through the kind offices of Dr. A. F. Batalin, the Director of the Imperial Botanic Garden of St. Petersburg, Kew, has received from that establishment a valuable consignment of dried plants, from various parts of the world. Altogether there are about 1,000 species, and those from Central Asia and North-western

China, collected by the eminent Russian travellers Potanin, Przewalsky and Regel, are particularly valuable.

New Forage plant.—The plant described in the following letter might prove useful in Australia, South Africa, and the cooler parts of India.

United States Department of Agriculture,
August 1, 1896.

DEAR SIR,

I FORWARD you to-day, enclosed in separate wrapper, a small package of seed of the Florida beggar weed (*Desmodium tortuosum* Swz.), a wild forage plant highly esteemed in the sub-tropical portions of the United States. It produces fodder of fine quality in large quantities, and grows best on sandy soils containing lime. On cultivated lands it grows often 8 to 10 feet high. The haulms, though rather woody, are eaten by cattle and working stock of all kinds. Beggar weed makes an excellent green manure. In Florida it is extensively used as a renewer of worn lands. It promises to be a plant of much agricultural value in the warmer countries.

Respectfully,

F. LAMSON-SCRIBNER,
Agrostologist.

The Director,
Royal Gardens, Kew.

Lemon and Lime trees as hedge plants.—In the *Annual Report* of the Department of Agriculture of Queensland for the year 1894-95, pp. 55-56, it is recommended to utilize the lemon tree (*Citrus Medica*, var. *Limonum*) as a hedge plant. For some years the lime tree (*Citrus Medica*, var. *acida*) has been so used in the West Indies with great success. The only drawback noticed in the use of the latter has been the occasional dying out of the trees in patches, due probably to the uncongenial nature of the soil. The same thing also occurs in old established yew hedges in this country. Apart from this circumstance, lemon and lime trees are capable of forming very serviceable hedges in tropical and sub-tropical countries. The paragraph mentioned is as follows:—

“The cutting up of large estates into small farms necessitates a large amount of fencing that was not before required. It is a considerable item in the expense of starting operations. The posts are generally to be found on the land or near by, but the time is fast coming when they will have to be brought from a distance. Everyone is cutting down, and nobody planting timber, with the resultant annihilation of the timber. To meet the difficulty, hedge planting will have to be resorted to, for which purposes no plant in the colony is so thoroughly adapted as the common lemon. If, where fences are being erected, or along existing fences, a few seeds were dropped in at about 18 inches apart, a hedge would in about four years be obtained, that no man or beast could penetrate. There is a row growing here, not quite five years old, with stems six and seven inches in diameter. Plants of course can be used instead of seeds. The raising of quickthorn for hedges in the old country is a business, and a similar business could be made of raising lemons here. A lemon hedge six or seven years old would require something in the way of a locomotive to punch through it.”

D. BUCHANAN.